CHEMICAL PRODUCTION PROCESSES AND SYSTEMS

CROSS REFERENCE TO RELATED APPLICATION

This application is a divisional of U.S. patent application Ser. No. 12/104,394 which was filed Apr. 16, 2008, entitled "Chemical Production Processes and Systems", the entirety of which is incorporated by reference herein.

FEDERALLY-SPONSORED RESEARCH AND DEVELOPMENT

This invention was made with Government support under Contract DE-AC0576RL01830 awarded by the U.S. Department of Energy. The Government has certain rights in the invention.

TECHNICAL FIELD

The present disclosure relates to chemical production processes and systems.

BACKGROUND

As the production of the multyhydric alcohol compounds has increased, conversion of these compounds to higher value compounds may be desired. For example, biodiesel fuel production methods can result in the production of by-product multihydric alcohol compounds such as glycerol. This glycerol can be converted to higher value polyols such as propylene glycol. This conversion may be desired to eliminate the glycerol by-product waste stream. The present disclosure provides chemical production systems and processes that allow for the conversion of multihydric alcohol compounds.

SUMMARY

Hydrogenolysis systems are provided that can include a reactant reservoir configured to contain a polyhydric alcohol compound and a reactor coupled to the reactant reservoir, the reactor housing an Ru-comprising hydrogenolysis catalyst and configured to expose the polyhydric alcohol compound to the catalyst, wherein the contents of the reactor is maintained at a neutral or acidic pH during the exposing.

Hydrogenolysis reactors are provided that contain a mixture comprising a polyhydric alcohol compound and an Ru-composition, wherein a pH of the mixture is neutral or acidic.

Hydrogenolysis processes are provided that can include exposing a polyhydric alcohol compound to an Ru-comprising catalyst to form a mixture, with the mixture having a neutral or acidic pH.

Processes for hydrogenolysing polyhydric alcohol compounds also include exposing a reactant mixture to an Ru-comprising catalyst, and while exposing the mixture to the catalyst, maintaining the contents of the reactor at a neutral or acidic pH. Processes also include providing a reactant mixture comprising a polyhydric alcohol compound and a base, wherein a weight ratio of the base to the compound is between 0.01 and 0.05, and exposing the mixture to a catalyst to at least partially hydrogenolyze a portion of the polyhydric alcohol compound.

Hydrogenolysis systems are provided that include a reactant reservoir coupled to a reactor, the reservoir configured to confine a reactant mixture, the reactant mixture comprising a polyhydric alcohol compound and a base, wherein a weight ratio of the base to the compound to is less than 0.05. Systems also include a reactor coupled to both a reactant reservoir and a product reservoir, a reactant mixture within the reactant reservoir, the reactant mixture comprising a polyhydric alcohol compound and a base, a product mixture within the product reservoir, the product reservoir comprising a hydrogenolyzed polyhydric alcohol compound and salts of organic acids, and wherein the moles of base are substantially equivalent to the moles of salts or organic acids.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the disclosure are described below with reference to the following accompanying drawings.

FIG. **1** is a portion of a chemical production system according to an embodiment of the disclosure.

FIG. **2** is graphical representation of data acquired utilizing the processes and methods described according to an embodiment.

FIG. **3** is graphical representation of data acquired utilizing the processes and methods described according to an embodiment.

FIG. **4** is graphical representation of data acquired utilizing the processes and methods described according to an embodiment.

FIG. **5** is graphical representation of data acquired utilizing the processes and methods described according to an embodiment.

FIG. **6** is graphical representation of data acquired utilizing the processes and methods described according to an embodiment.

FIG. **7** is graphical representation of data acquired utilizing the processes and methods described according to an embodiment.

FIG. **8** is a chemical production system according to an embodiment of the disclosure.

DESCRIPTION

This disclosure is submitted in furtherance of the constitutional purposes of the U.S. Patent Laws "to promote the progress of science and useful arts" (Article 1, Section 8).

Chemical production processes and systems are described with reference to FIGS. **1-8**. Referring first to FIG. **1**, a portion of a chemical production system **10** is shown that includes a reactor **12** housing a catalyst **14**. Reactor **12** can be configured to be in fluid communication with a reactant stream **16** and a product stream **18**. Reactor **12** within system **10** can be configured as an in-line reactor, but the present disclosure is not limited thereto. For example, other reactors can be utilized within system **10**. The chemical processes can be facilitated in any reactor suitable for use under the desired conditions of temperature, pressure, solvent, and contact time. Examples reactors include but are not limited to: trickle bed, bubble column reactors, and continuous stirred tanks.

Reactant stream **16** coupled to reactor **12** can be received from a reservoir configured to contain a polyhydric alcohol compound. This polyhydric alcohol compound can be included in an aqueous solution containing as much as 90% water, for example. According to example implementations, reactant stream **16** can contain as much as 55% water and/or about 45% polyhydric alcohol compound. According to other implementations, stream **16** can contain between 20% and 40% polyhydric compound and a base. The base can be about 2% of the stream. Example embodiments of the process provide for the stream to have weight ratio of base to polyhydric compound. The weight ratio can be less than 0.05 or between